Exterminators Log

Volume 1 JULY, 1933 Number 7

Pyde-Pyper

THE NEW, MARVELOUS
NON-POISONOUS RATICIDE

See Page 2 and Back Cover

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PICKWICK
HOTEL

500 ROOMS
with bath and radio in every room. Exceptional food at moderate prices.

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KANSAS CITY

EXTERMINATORS LOG

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512 East 14th St., Kansas City, Mo.

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AFTER ALL'S SAID AND DONE

THE WAY TO ADVERTISE IS TO ADVERTISE IN THE EXTERMINATORS LOG

A gesture at advertising, a pretense at advertising doesn't produce results.

Advertisers who use the EXTERMINATORS LOG to reach a responsive audience, may expect profitable response.

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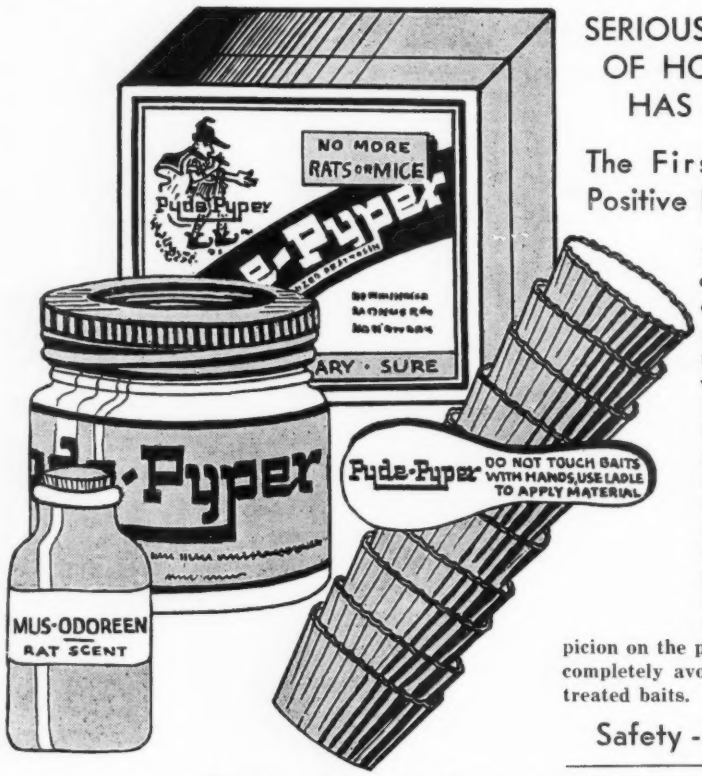

SERIOUS PROBLEM IN MILLIONS OF HOMES AND INDUSTRIES HAS NOW BEEN SOLVED

The First Scientific Raticide and Positive Means for Rodent Control

Years of patient effort by a great scientific research organization have produced a remarkable formula making possible at last scientific control of rats and mice. This important new development is known as PYDE-PYPER. Predicated upon a known characteristic of rats and mice, namely, location of food by sense of smell, it has been made possible to actually "lure" rodents to treated baits by use of an oil, extracted from the fat of rats, destroying them with a powerful, non-poisonous, jelly paste. Rodents partaking of baits do not evidence external symptoms until the fifth hour. Suspicion on the part of other members of the colony is completely avoided, causing greater consumption of treated baits.

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1-lb. One Glass Jar.....$5.00, less 33⅓ %

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(f) Will never spoil; freezing or boiling does not impair potency.
(g) Rats die in 10 to 24 hours by strangulation; carcass is lean and thin; objectionable odors are always minimized.
(h) Costs as little as ⅙c per bait. The average home may be treated at a cost of 15c.

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Please Send Check or Money Order With Each Order

Rats and Raticides

By J. A. ROBINSON

(Director of Sales, The MUS System, and Affiliate International Research Society of London, England.)

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PART IV

"The subject matter contained in this article and several others to follow, is of unusual importance to every professional in this country. It deals with a problem that has created great trouble, not only for the customer but also for the Exterminator. Service is an intangible commodity. Its constant improvement may only come as a result of intelligent application of knowledge. The author here affords, not only a practical insight into a difficult problem but acquaints the Industry with an academic knowledge that has not been previously vouchsafed to its members."—Editor's note.

Odor — Cause and Effect

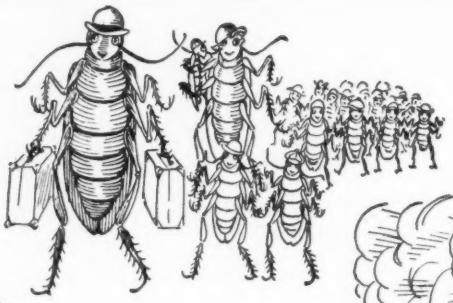
One of the most difficult problems faced by the professional in the extermination of rodent pests is the obnoxious effects of effluvia emanating from decomposing carcasses, deposited in inaccessible spots. In dealing with this problem the author takes full cognizance of the many manufacturers of Raticides who claim to "petrify" or "embalm" rats, thereby eliminating the embarrassing and highly objectionable aftermath of stench. Such claims are generally predicated upon sheer ignorance of the true factors controlling the highly important feature of "odor." Only by familiarity with the actual cause can the effect be controlled.

Redi, Italian scientist, was the first to disprove the ancient theory of Aristotle and other learned contemporaries, that rats and mice were the products of spontaneous combustion. He placed a piece of fresh meat in the sun and covered it with fine cheesecloth. Several hours later, examination disclosed that flies had deposited their eggs; after hatching, maggots were found, not on the meat, but on the cloth, proving that all living organisms were generated from a living seed and not as a result of spontaneous combustion.

A rat partaking of poison will of course, have the blood stream polluted. Gases accumulate in the stomach rapidly; very often they cannot be passed out of the system fast enough, through the normal outlets, and will explode, actually bursting the abdomen. Exposure of the entrails results in intense odor. In other instances, the carcass becomes swollen and bloated. Dead animal and vegetable tissues in nature undergo putrefactive decomposition because of the action of bacteria. Often, this natural process may be arrested by unusual climatic conditions or the nature of the atmosphere immediately surrounding the organic matter, but as a general rule, Nature can be depended upon to undergo her normal processes.

In its simplest form, odor is an impression registered upon the brain by a message transmitted through the soft, pulpy mass, located at the base of the nostrils and known as the olfactory organ. Science however, translates odor as Energy or Work. Its common forms are heat, light, electricity. Chemical energy stored up may be released as heat. The union of oxygen with a substance is called oxidation. Oxidation may be so slow that no light is evolved and very little if any rise in temperature noticed. As a matter of fact when a gram of any substance is oxidized slowly exactly the same quantity of heat is liberated as during violent burning. In slow oxidation heat is usually conducted away so rapidly that a rise in temperature is not noticed. If the heat from a slow oxidation is not conducted away fast enough, it may accumulate, finally bringing the temperature of the substance to the ignition point. This is spontaneous combustion.

Odor from dead carcasses is therefore a direct result of oxidation — the action of the air upon the fat, tissue and muscles. Normally, oxidation must occur and therefore odor must follow. Heat however, determines intensity of odor — the higher the temperature, the more noticeable odor will be. Conversely, this will explain why warehouses, garages and other ordinarily cool premises, rarely complain of effluvia from rat carcasses.



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KILLS—
Flies, Roaches, Moths and Certain Other Insect Pests

A SUPERIOR STEAM VAPORIZER

Test after test proves decisively that the Daisy Steam Vaporization Method of Insect Control is not only scientifically efficient but also economically better. Professional Exterminators find the New DAISY EXTERMINATOR and EXTERMO fluid a combination that meets their demands for a safe, sure, quick and low cost method to do a most thorough job.

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Pleased clients make increased business and booming profits for you. The DAISY EXTERMINATOR makes money and builds trade. Check the superior features of the DAISY. Then, let it prove its unusual efficiency and low cost of operation.

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Order a DAISY EXTERMINATOR and one gallon of EXTERMO FLUID. YOUR COST for both is $16.50. However, on your order accompanied by cash, you get an EXTRA DISCOUNT of 5%, making a trial unit cost of only $15.65. Shipping charges prepaid.

(This offer is made for cash to eliminate bookkeeping expense.)

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The Daisy Distributing Co.

1009 East 26th St.,
KANSAS CITY, MISSOURI

What About Termites?

By EVAN L. FELLMAN
Manager Terminix Division, E. L. Bruce Company

▼ ▼ ▼

"Termites may come, and termites may go, but the wood in our homes goes with them."

The quotation may not be accurate, but the statement is correct. For termites may easily be coming and going to and from the woodwork in your home, causing certain ultimate damage. And you may not even dream that such a thing could be happening.

Articles of varying degrees of authenticity which have appeared on the subject of termites and their control, have occasioned a flurry of interest and mis-understanding, which deserves careful consideration. It is therefore the purpose of this article to state as briefly as possible the facts relative to the subject as seen by the E. L. Bruce Company who, in addition to their widespread hardwood flooring and lumber interest, have become during the past few years the undisputed leader in the field of termite control work.

Termites (often called White or flying ants), ant-size, creamy white and wingless in the working stage, and of darker color and with wings during the swarming seasons in spring and fall when they are ordinarily seen, are definitely attacking and at least partially destroying the important wood members in buildings the country over.

With striking similarity to a slow-burning fire termite attack in a home or building "burns" on uninterruptedly, day in and day out, until steps are taken to extinguish it.

Much Damage Done

More than forty million dollars in damage to homes and buildings is caused by termites each year. They are the most ravenous, the most destructive and one of the most difficult to exterminate of all pests.

Attacking in colonies often numbering millions —silently and unseen, Termites always work within the wood. Eventually only a thin shell remains to protect them from their natural enemies and to hide their damage from your sight.

Termites are an age-old menace. Their systematic destructive tactics, now more than ever before, are reaching startling proportions. Formerly Termites lived chiefly in the forests, but with the introduction of modern building, close to the ground and heated, they have found conditions ideally suited for rapid propagation.

Easy to Control

Contrary to the usual conception, Termites are not easy to control. The various crevices and hidden situations in the construction timbers of homes and buildings make ideal feeding grounds. These places are, as a rule, difficult to reach and therefore extermination is a difficult problem. Termites are of concern to nearly every State in the Union—and in some cities eight of every ten homes are found infested — actually being eaten away and seriously damaged.

The principal food for Termites is wood. They also attack clothing, shoes, rugs and paper. A frequent experience is to find books which have been unmoved in book cases for long periods, with their pages grotesquely riddled by Termites.

Like everything else about the Termite, its method of digesting is unique. Cellulose, its food, is very difficult to digest. So nature stepped in and allowed certain protozoa (one-celled creatures) to find shelter in the intestinal tract of the Termite. These intestinal fauna guests eat the cellulose and then very obligingly die. The Ter-

mite digests the dead protozoa and in that process obtains the cellulose all prepared and ready for home consumption.

While the damage from Termites is of concern primarily to the property owner they are also frequently found attacking lumber stocks of various types in lumber yards, furniture factories, etc.

Although more than 1,000 species of Termites are known, of which 46 have been found in the United States, we are seriously concerned in this country only with that group known as subterranean Termites which live in the ground where necessary moisture is found, and which build branching shelter tubes up and some times through foundation walls and pillars through which contact with wood above, the food, is made.

Highly Colonized

Termites are highly colonized. Their activities are intelligently conducted. They require only one small point of contact with the wood understructure to enable them to eventually infest and materially damage many portions of the structure. Hence, it is obvious why surface treatment of exposed woodwork—the common control method—furnishes little if any protection.

When termites are found attacking the woodwork in a home or other building it can be definitely assumed that, unless effective means are employed to retard their attacks, the depredations will continue until such time when repairs and replacements which are often costly become necessary. If guaranteed methods of proved effectiveness are used in controlling the termites the cost of repairs and replacements can be either materially reduced or entirely eliminated.

Further, if termites are found only attacking wood debris in the ground below the structure it can be safely assumed that at some later date they will extend their activities to the structure itself if no protective measures are taken.

Wood is the universal building material. It is of course unfortunate that it is subject to termite attack. It behooves the lumber industry to become acquainted with the problem so that users of wood may be assured that termites present absolutely no menace when properly preserved lumber is used in new construction, and that in standing structures of untreated wood where termites are found, effective methods are now known of controlling them at reasonable cost. Such understanding tends to save the large present market for lumber, whereas refusal to recognize the facts must only tend to lend greater opportunities for the inroads of substitutes for wood.

Many ask: "Is this something new? I never heard much of Termites before." Termites have been here a long time—many millions of years claimed by paleontologists. Lack of public understanding of the insect, however, is the main reason. Termites (usually called "White Ants" or "Flying Ants") are seen generally in Spring and Fall. These winged forms do no damage and hence people have not associated them with the little white worker Termites which remain within the wood and their tunnels to avoid light. When their damage has been discovered, it has often been incorrectly termed "Dry Rot" and accepted as unavoidable.

But it is true that Termites are attacking houses in greater numbers today than in years past. As towns and cities have been built where forests formerly stood the Termites found the wood in homes equally as palatable as the dead trees which had been removed. And, with the advent of central heating systems, he is finding existence easier even in the more Northern sections. From the open, unprotected, unheated forest abode, he has come to desire the warm, dark, damp areas under buildings. Once the colony is started, he may even build long tunnels underground from one house to another.

Finally, Termites are very difficult to detect. They are secretive and usually succeed in hiding their work to all except those intimately acquainted with their habits.

Appreciation of the value of reliable Termite insurance is rapidly growing. It is to be considered in the same light as fire insurance. Every property owner should request an inspection by a reliable Termite control company. If Termites are found, the economy of securing efficient protection against them should be recognized. Termite colonies increase rapidly in size; damage once begun, continues slowly and steadily unless steps are taken to insulate the structure against continued termite attack.

The Founding of New Colonies by Reticulitermes Flavipes Kollar

By THOMAS E. SNYDER
U. S. Bureau of Entomology . . . and
EDITH P. POPENOE

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During the early Spring of 1931, breeding and crossing experiments were again instituted at Washington, D. C., with reproductive forms of the termite **Reticulitermes flavipes** Kol. There have been differences in the results of breeding experiments carried on by entomologists in this country and abroad. In case of species of **Reticulitermes,** Snyder's experiments have shown that the first brood reared by macropterous adults are all workers except one or two soldiers. The first brood of brachypterous adults appear to be the same; but even in long established colonies no macropterous adults are produced where the parents are brachypterous. Of course where the parent adults are macropterous, winged or macropterous forms are later produced. No success has been attained in breeding apterous reproductive forms in these artificial colonies maintained in the laboratory.

Like the macropterous adults, brachypterous and apterous reproductive forms are true adult castes. They apparently breed true to type over long periods and never produce macropterous forms. Imms and the late Dr. Thompson with Snyder believe that the origin of the termite castes can best be explained by genetics; there is a parallelism between these castes and Mendelian segregants. While the progeny would vary with the age of the colony of termites and with the

(Continued on page 15)

Exterminators have nothing to sell—*but* RESULTS....

These Hopkins Tested Insecticides Take The Guesswork Out of Your Business.

HOPKINS' PYRETHRUM PRODUCTS
Deadly to bugs and insects—utterly harmless to man and domestic animals. Hopkins' Pyrethrum Powder is made of specially selected insect flowers and yields consistently high killing power. Hopkins' Pyrethrum Concentrate (Extract) 5 - 1 is made by repercolation with 5 pounds of tested flowers to the gallon of extract.

HOPKINS' ROACH AND ANT POWDER
Answers roach and ant invasions with a deadly, sure-kill touch. Sold only in bulk to manufacturers and exterminators.

HOPKINS' RAJAH BRAND SODIUM FLUORIDE
Highly effective. Imported. Free flowing.

POWDERED DERRIS ROOT
Double action (contact and stomach). Harmless to human beings and domestic animals.

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Physiologically
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RED-RAT-SQUIL

. . . the one exterminator FATAL to rats and mice—harmless to human beings and domestic animals.

Rats and mice take this powder readily—either as is or when baited with foods.

Fully tested. Keeps indefinitely.

Write for folder describing easy methods of baiting.

Write for Booklet and Quotations

J. L. HOPKINS & CO., 220 Broadway, New York, N. Y.

RED ANTS

ANT-KNOC ANT-KNOC

A New Scientific Formula Discovered for Red Ants—Stood the Acid Tests of Experiments for Three Years

PROVEN TO BE A POSITIVE AND CERTAIN REMEDY FOR RED ANTS

A Super-Marvelous Red Ant Exterminator

Mail check or money order for a sample bottle

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The New Scientific Discovery

After three years of acid testing, a new scientific formula has been discovered for red ants and the small black ants, known as ANT-KNOC.

This new formula has been put to the acid test by baiting red ants for over three year in hotels, homes, and apartment buildings without one single failure.

ANT-KNOC is a powerful remedy concocted into a syrup solution which remains fresh.

ANT-KNOC is already prepared, no mixing, just pour the liquid in a small container and follow it up one or two days later for several days.

It is truly amazing to note the results obtained from ANT-KNOC in exterminating red ants. ANT-KNOC will do what other ant remedies have failed to do.

Exterminators have found in their experience that red ants are one of the most difficult pests to exterminate, especially in large institutions where premises are infested.

While there have been many claims made and various remedies offered to the public to exterminate red ants, yet, for scientific control of red ants, it has been a dilemma to all who have to meet this problem.

ANT-KNOC is a deadly poison and by scientific research has proven to be superior to any so-called red ant remedies.

Most ant remedies are in food form. ANT-KNOC is a liquid syrup that does not lose its potency, always remaining fresh. ANT-KNOC is the latest scientific production and most effective remedy for red ants yet discovered.

In order to afford every user an opportunity to convince themselves of the superiority of ANT-KNOC and its remarkable effects on red ants, and for test purposes, we have prepared a sample bottle at the amazing low price of two dollars, prepaid.

Neglect Flies and Lose Patrons!

By CHARLES R. LICHTENBERG
Of Chicago Sanitary Products Company

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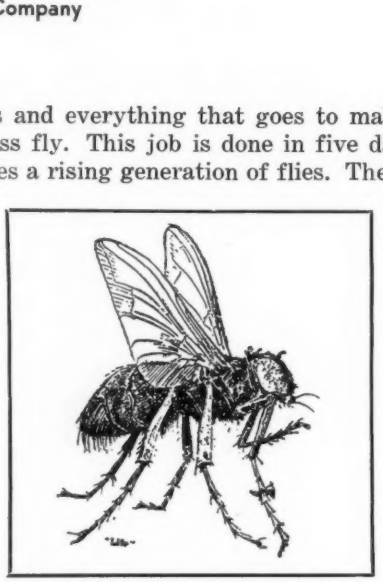
That sums up the principal reason why many fine roadside establishments do not have the trade they deserve. No eating establishment or food purveying place can hope for substantial patronage unless it first takes steps to solve the fly problem.

As the warm weather approaches, the fly, man's deadliest enemy, begins to breed by the millions. Spring and early summer, therefore, is the time when the alert roadside establishment proprietor wages his most intensive campaign to exterminate this insect pest.

The fly is unquestionably man's greatest "public enemy." The indictment against him contains the following nine points:

1. A single fly can carry 6,000,000 germs.
2. Seventy-five thousand people in the United States are killed yearly by flies.
3. Flies have carried death to more human beings than all the beasts of prey and poisonous reptiles combined.
4. Thirty diseases are definitely traced to flies.
5. Typhoid, tuberculosis, diarrhea, cholera, and summer complaint are spread by them.
6. Two flies can produce a family totaling 5,598,720,000,000 in one summer.
7. Each female fly lays 120 eggs at a time.
8. A new generation is born every two weeks.
9. The total annual damage to humans and animals caused by flies, mosquitoes and other insects totals $368,000,000 annually.

A brief description of the fly from its birth until it reaches your dining room gives an idea of the real health peril it carries in its wake. The fly lays a setting of eggs in a manure pile or other filthy place, for flies breed and thrive only on dirt. These are hatched into tiny, wiggly white maggots before night. They then squirm around in manure for four or five days, get fat and grow a shell. Once in a shell, they start growing wings and legs and everything that goes to make up a first class fly. This job is done in five days and out comes a rising generation of flies. They crawl



to the outside of the manure pile, where they dry their wings, take their first breakfast of filth and then make a quick flight for your kitchen or dining room. Yes, these are the flies you saw on your tables this morning.

Flies are prize boarders. They like their meals every 15 minutes, and a hungry fly can eat half its weight of food in a single meal. Food across which flies have walked with their hairy legs and disease-laden bodies has been examined and in its tracks a line of disease microbes of 30 different varieties found. In a few hours these germs multiply and form great colonies, ready to enter the blood stream of anyone consuming the contaminated food. In milk particularly do fly germs multiply with lightning like rapidity.

Methods of killing the housefly have progressed all the way from the days of clumsy, inadequate sticky fly paper and tape, liquid poisons that were the cause of many a tragedy, and the ineffectual unsanitary fly swatter, up to the present, when chemical insecticide has been recognized as the most effectual and hygienic means of ridding a room not only of flies but all other household pests.

It has been found that the respiratory system of the fly consists of a row of exposed breathing

pores on each side of the body, connected by delicate tubes to very thin walled sacs within the body. It is the insect's most vulnerable spot. Spraying acts directly on the insect's breathing apparatus, the effect of the spray paralyzing its lungs. The insect soon dies and "stays dead," instead of briskly coming to life again, as do many swatted flies. Spraying not only kills the insect, but prevents the scattering of germs and the spreading of diseases which usually results when a fly is crushed in swatting.

You operators of roadside establishments who have realized the importance of fly extermination and made a consistent fight against these pestilent trade killers also realize the fact that continuous warfare against these rapid breeders is a profitable investment.

A few minutes each day with quality chemicals and apparatus supplied by responsible manufacturing chemists who have made a study of the problem for years will assure the results desired. Many establishments have tried out inferior materials and methods with little success and given up the fight against the pestilent fly; but we wish to assure operators of roadside places that fly extermination is possible where proper materials and apparatus are used according to instructions.

The fly is a trade killer. The public abhors sitting at a table or counter where these flying pests are buzzing and walking over surfaces, dishes, victuals and refreshments. Fly extermination is a trade builder and no roadside place can afford to ignore spending daily the few minutes necessary to carry on a successful war against the pest.

Important Facts to Exterminators

By W. W. HINDS

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Every honest exterminator is a research student, constantly working out and testing new methods of handling old problems. Like all other research workers, most of his ideas fail, but not all of them. Once in a great while one of them "clicks."

I know a man in a southern city who is conducting a very small extermination service business. He has specialized on one insect—the termite, and has worked out a new idea in handling the termite problem. During the past four or five years he has applied his new method to probably fifty buildings, and it has been exactly 100% effective; in not a single case have the termites ever returned to a building that had been treated. His method, of course, is a closely guarded secret. However, I do know that he is not using some wonderful, new product. The improvement is all in his method of doing the work.

It is improbable that the average exterminator will ever discover a new insecticide. His training and equipment do not fit him for research work of that kind, and he can well afford to leave experiments with new products to the scientist, who after a thousand years, have produced about a dozen really effective insecticides.

But the exterminator is in position to make important discoveries and improvements in the methods of handling the known insecticides. His connection with the use of insecticides is an economic one, his "bread and butter" depend on his ability to make his ideas work.

We can hardly blame the termite man mentioned above for keeping his method secret; it is his own discovery, worked out through careful study and tests, and he feels that he has a right to its exclusive use. But is he justified in keeping it to himself? He can reach only a very limited number of persons in need of his service, while thousands beyond his reach are in very great need of his secret.

If the knowledge held in secret by those engaged in extermination work could be collected, combined and published, it would be of greater value than any scientific publication, on insect control, yet produced. I do not know how it could be done, but if the Exterminators Log, as the leader in this field, could induce its exterminator readers to engage in an exchange of ideas, and publish these ideas in each issue, it would be rendering a real service, not only to the trade, but to the world at large.

Items of Interest

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NEW BILL SUBMITTED TO CONGRESS TO SUPPLANT FOOD AND DRUGS ACT

Declaring that nearly 27 years' experience in the enforcement of the Federal Food and Drugs Act has disclosed many serious deficiencies in its provisions, Secretary Wallace, by direction of President Roosevelt, on June 1, submitted to Senator Ellison D. Smith and to Representative Marvin Jones, chairmen, respectively, of the Senate Committee on Agriculture and Forestry and the House Committee on Agriculture, a bill designed to supplant the present Federal Food and Drugs Act. The bill was prepared under the direction of Assistant Secretary R. G. Tugwell; Walter G. Campbell, Chief of the Food and Drug Administration; and the Solicitor's Office of the Department, and has been approved by the Department of Justice.

Some of the most significant provisions of the bill as briefly outlined in the Secretary's letters to the committee chairmen, are the following:

(1) Prevention of false advertising. The need for the control of serious abuses in this field is generally recognized.

(2) The inclusion of cosmetics. Serious injuries have occurred through the sale and use of harmful cosmetic products. The labeling and advertising of such products should be regulated.

(3) Establishment of tolerances for added poisons in foods. A complete elimination of all poisonous substances from foods may be impossible. Where the presence of poisons is unavoidable, their amounts should be kept so low that by no possibility will the food be harmful to health. The present law contains no provision authorizing the establishment of tolerances for poisons, but imposes upon the Government the obligation of showing affirmatively in every case that a food containing poisonous substances may be harmful to health independent of similar adulterations prevailing extensively in other foods.

(4) Authority for the Secretary, after notice and hearing, to promulgate definitions and standards for foods which will have the force and effect of law. Under the present law such authority extends to the field of canned foods only. Legal food standards like those now existing for official drug products are essential for efficient enforcement operations.

(5) Power to require manufacturers to procure in certain cases Federal permits. This method of regulation will be invoked in those instances only where a menace to health is involved and where adequate protection to the public cannot be effected through the other provisions of the bill.

(6) The control of drug products on the basis of therapeutic claims which are contrary to the general agreement of medical opinion. This removes the burden imposed by the present law of proving not only that such statements are false, but that they were made with fraudulent intent on the part of the manufacturer. This has seriously handicapped the Department in the extension of adequate protection to the public in the purchase of drugs labeled as treatments for various diseases.

(7) Requirement that labels be informative. With one or two minor exceptions the present act contains no positive labeling requirement; it merely prohibits false or misleading statements and these prohibitions are to some extent minimized by excepting provisos. A disclosure on the label of sufficient facts to enable intelligent and discriminating buying will operate unquestionably to the advantage of the consumer.

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ROTENONE CHEMISTS WIN MEDAL

In recognition of one of the oustanding recent accomplishments of the research work of the Department of Agriculture, Drs. F. B. LaForge and H. L. J. Haller, of the Bureau of Chemistry and Soils, have been awarded the Hillebrand Medal of the Chemical Society of Washington, by the society, for their contribution to the knowledge of the chemical structure of rotenone, an insecticidal material derived from the tropical plants derris and cube which is expected to play an important part in insect control in agriculture. With a knowledge of the chemical structure of the rotenone it is expected to be possible to synthesize the substance in large-scale manufacture. In making their discovery LaForge and Haller won a race with chemists in Germany, England, and Japan.

One of the great advantages of rotenone as an insecticide is that, although it is deadly to many insects, it is harmless to humans and warm-blooded animals; and it does not leave injurious residue on fruit and vegetables as is sometimes the case with arsenical sprays.

The Hillebrand Medal was established by the society in memory of Dr. W. F. Hillebrand, formerly chief chemist of the U. S. Bureau of Standards, and a founder and past president of the American Chemical Society.

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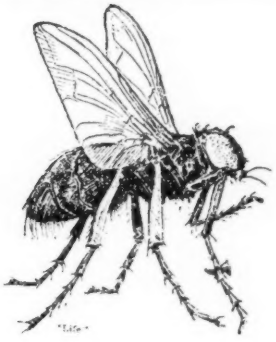

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INTEREST IN "THE NEW DEAL"

To the Editor:

We are interested in "The New Deal" ideas expressed in your last issue of the Exterminators Log.

Let us suggest that you carry these ideas further and stimulate through your pages the immediate necessity of a strong "Code of Ethics" and a national organization sponsored and maintained by State associations.

Very truly yours,

(Signed) Southern Termite Insulating Co.

J. M. Miller.

Do You Know That

⋈ ⋈ ⋈

The average fly lives eight to twenty-one days.

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Bed bugs have been known to live many months without food.

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The average life of a roach is from twelve months to three years.

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During the life of a roach she may lay as many as twenty-five capsules of eggs.

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It takes about two months under favorable conditions for the bed bug to reach maturity.

⋈ ⋈ ⋈

The female bed bug can account for from seventy-five to a hundred thousand offspring in a year.

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The female roach can account for about a hundred and sixty thousand to three hundred thousand offspring.

⋈ ⋈ ⋈

It may take many months for the moth to reach maturity during which time the larvae feeds on woolens, furs, carpets, upholstered furniture, feathers, etc.

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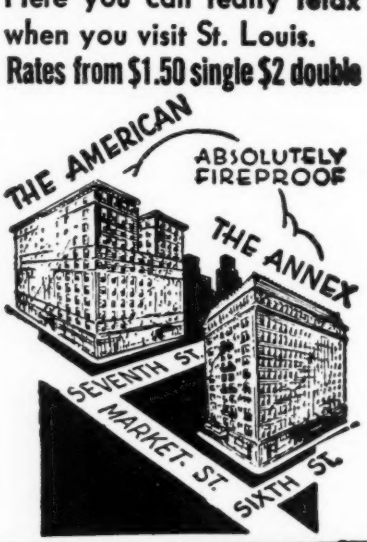

in ST. LOUIS

The Founding of New Colonies by Reticulitermes Flavipes Kollar

(Concluded from page 7)

genus or at least family, the character of the brood might be predicted by generalized formulae.

On April 18th, a series of eight groups of incipient colonies of macropterous males and females were placed gregariously in eight tin covered boxes each containing moist sand, a small block of white pine wood with a cell excavated on the under surface where in contact with the sand and several disks of specially washed pure cellulose filter paper, Whatman number 43.

These macropterous adults were collected at Falls Church, Va., from parent colonies from which the first swarm of winged adults had not yet occured that season. Since they still had their wings, copulation had not yet taken place. Young brachypterous adults, freshly molted to maturity but not fully pigmented, were also collected from these colonies in nature before the swarm and hence these forms also had not yet copulated. Copulation does not take place until after leaving the parent colony and the establishment of new incipient colonies.

On April 27th, two similar pure incipient colonies of brachypterous sexual adults of **R. flavipes** were established gregariously in like manner with the exception that workers were added, as has been found necessary to feed these reproductive forms free from intestinal protozoa, as well as a few soldiers.

On April 29th and 30th, ten colonies of crosses of macropterous and brachypterous males and females were established gregariously in similar colonies, workers and soldiers being added. The ratio of males to females ranged from an equal number, as 6 to 6; to one half as many, **11 males** to 22 females or 17 to 34; or the proportion of 14 males to 18 females, or 15 to 19.

Sexual attraction was immediately evidenced in the crossed as well as pure colonies. Apparently there was no difference in degree, whether the male was macropterous or brachypterous, the female of the opposite type was equally attractive and attracted, for this caudal attraction of male to female was also to be evidenced in attraction of the female to the male.

On April 20th, in the pure colonies of macropterous adults there was aggregation to the soil underneath the filter paper disks—no adults were in the cell previously excavated in the block of wood for them—all were dealated. April 21st showed definite funnel shaped pits.

On May 11th clusters of eggs the size of small peas were in these colonies; on May 17th more eggs were present—all being in a mass together or in other cases there being two smaller clusters in separate cells.

On May 28th one newly hatched termite was observed. On June 2nd from 1 to 8 recently hatched young were observed in the colonies. On June 20th and 24th young and eggs were numerous. Only June 29th eggs and young were present. On July 7th there was a noticeable difference in the sizes of the young of various ages, eggs were also present. On July 18th some of the young were fairly large, newly hatched young still were present. On July 24th and 30th young of different ages were present, some of fairly large size, young were numerous in these gregarious colonies, eggs were also present. On August 8th clusters of eggs, recently hatched young and young of larger size were present. August 14th showed but little change. On August 24th the young were of fairly large size.

On September 4th, several colonies were dead, others moribund, the young either dying or being eaten before the death of the adults. On September 12th and 21st, many young were present in the surviving colonies, including recently hatched young. On October 2nd and 12th fairly large to very small young were present in these colonies. On October 22nd other colonies were dead, the young always being the first to disappear. Clean filter paper was constantly used to replace moldy paper and films of mold on the sand were removed when observed. The temperature and humidity were kept as nearly the same as possible.

On November 3rd, 11th and 24th, young were present in all remaining colonies; December 4th showed the same condition. On December 9th and 14th no recently hatched or very young were observed in the three surviving colonies. All of the brood were of the nanitic mature adult size so characteristic of young or incipient colonies. Only one or two soldiers were present, all of the others being workers.

To date, these experiments conducted during 1931 confirm the results of previous breedings first begun in 1911. The progeny of pure colonies of macropterous males and females is the same during the first nine months whether the colonies are in the aggregate or whether a single male and female produce the brood.

Gregarious colonies appear to be relatively somewhat healthier and more aggressive than those where the parents consist of a single male and female. This is interesting in connection with the experiments of Dr. W. C. Allee of the University of Chicago relating to the role of aggregation in ecology. Of course our data are meagre and inconclusive. Cleaning mold or mycelium off

of each other during "trophallaxis" or licking each other might explain these more favorable conditions in gregarious colonies.

True cannibalism was observed, healthy young being eaten—although food and moisture were apparently favorable. Filter paper was preferred to wood. Only in one colony was the artificial cell made in the block of wood utilized; in this case it was covered over with a shed of sand. In two other cases tubes or sheds of sand were constructed on the bottom or sides of the wood and used for colony habitations. In one instance the top of the block was grooved.

In the two pure colonies of gregarious brachypterous males and females established on April 27, young were produced, shortly after which both colonies died due to heavy mold infections.

The ten colonies of the crosses established on April 29th and 30th were in healthy condition on May 11, the males and females were active in cells together and the brachypterous reproductive adults were attaining a deeper yellow-brown pigmentation. On May 15 about three dozen eggs were present in one colony. Nematodes were abundant in some of the colonies and apparently destroyed two colonies. On May 17th the eggs were being tended by workers. On May 29th the workers were moving the eggs about from place to place so that sometimes the eggs were visible, at other times not. All but two of the surviving colonies had now died, probably due to mold. On June 1, the eggs were fewer in numbers.

On June 25th young termites several days old were observed in the colony where the 7 males were brachypterous and the 16 females were macropterous. On June 17, 24 and 29 a few young termites of different ages were observed in both remaining colonies; at least five young were visible at one time.

On July 3rd no young or macropterous female adults were observed, all being dead, and the brachypterous male adults were eating the workers alive, a piece at a time, workers being observed in various stages of dismemberment and the males actually feeding on them. On July 30th this colony was nearly all dead. On August 8th the brachypterous males were still alive and on September 1st several brachypterous males and a few workers survived.

On September 4th, three macropterous females were added to this colony from replacement colonies. On September 12th both the males and females were alive but most of the workers had been eaten alive although food and moisture conditions appeared to be satisfactory. On October 2nd the macropterous females were dead but had not been eaten; all the workers had disappeared. On October 22nd only one or two moribund brachypterous males were alive in a very weakened and shrunken condition. This colony was considered to be destroyed.

On July 18th, in the gregarious colony where the macropterous males were outnumbered by the brachypterous females in the ratio 22 to 11, newly hatched young were observed. On July 30th this colony was nearly all dead and no young remained.

These experiments confirm observations in nature that the various reproductive adults do crossbreed within the species and that they will do so in artificial colonies. In previous experiments only eggs had been obtained from similar crossings.

Eggs, healthy young and workers are eaten; cannibalism is a fact; living reproductive forms also are doubtless eaten. Cannibalism gives an easy and quick access to concentrated food and moisture. It probably is a common occurrence even under more natural conditions of colony life.

We still are unable to answer what is the progeny of these crosses. The authors believe that the character of the progeny can be predicted by genetic formulae, despite Weyer's recent criticism of Imm's formula, i. e., that the sexuals could not thus produce a normal colony.

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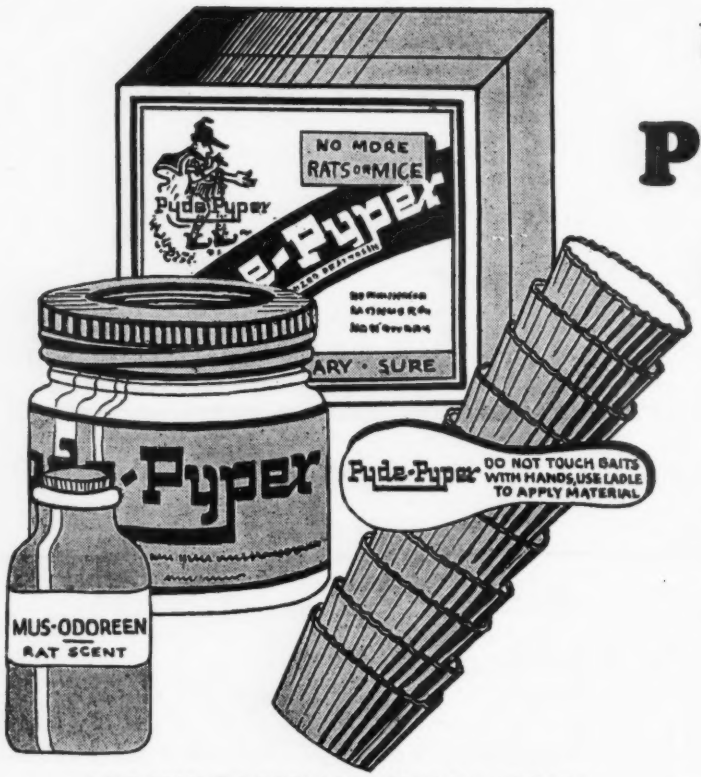

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